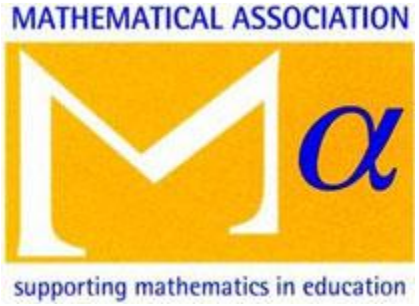

Review
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and of those who sought an accurate geometrical construction, by Lindemann's proof of its transcendence—of the sane ones, that is. After a digression on the algebraic formulation of Euclidean construction, a proof is given of the transcendence of π, "founded on that of Gordan," but both fuller and clearer than any yet published.

The abundant humour of the subject has been most happily described by De Morgan; and by publishing these lectures, which deal seriously with the famous problem, Professor Hobson has filled a real gap in English mathematical literature.

H. P. H.

The Laws of Thermodynamics. By W. H. MACAULAY. Pp. viii+71. 3s. net. 1913. (Camb. Univ. Press.)

This is the second of the *Cambridge Engineering Tracts*, and it is a masterly presentation of the subject for the beginner, and, as far as may be within its slender limits of space, from the point of view of the engineer. The aim is "to provide an accurate and connected account of the fundamental principles of thermodynamics, combined with a sketch of methods applying the theory in special cases, to supplement technical books on the subject." The wise beginner will keep it at his side for reference as his acquaintance with the subject proceeds. Perfect differentials are first explained and the first law is expounded. Particular types of substance are next dealt with, *e.g.* superheated vapour, throttled vapour, and perfect gas. A useful historical note is appended to the chapter on the second law. Entropy forms the subject-matter of the next two chapters, which conclude with an account of the electromotive force of a storage battery. In the final pages the theory of entropy is extended to the case of any number of independent variables. The author handles his subject throughout in a manner both concise and clear.

Key to A New Algebra. By S. BARNARD and J. M. CHILD. Vol. II., containing Parts IV., V. and VI. Pp. 447-915. 1913. (Macmillan.)

This Key not merely contains model solutions of all the problems, but alternative solutions at times are given, and notes explaining the principles involved are, when necessary, supplied. It will be a useful addition to the library of the student who has no one at his side to guide his progress, and there will no doubt be many teachers who will find that such a volume will save them considerable time and worry.

A Text-Book of Elementary Statics. By R. S. HEATH. Pp. xii+284. 4s. 6d. 1912. (Clarendon Press.)

This is a useful introduction to Statics and its applications so far as it can be applied without the aid of the Calculus. The treatment is both analytical and geometrical. The examples worked out are very judiciously selected, and deal almost entirely with the machines of practical life—bicycles, steam-engines, real pulleys and weighing machines, the chemical balance, overhauling, and the like. Graphical theory is not forgotten. The examples throughout are a mixture of the old and new styles. Chapter VII. may be taken as a fair sample of the arrangement. Here we have in succession: conditions of equilibrium of plane systems of forces, analytical reduction of a system of coplanar forces, general reduction of any system, reduction of a system to two forces, and so on, followed by worked-out examples on the rowing-boat, pressure on pedals and tension of chains of bicycle upon inclined plane, the step-ladder, the driving couple of a steam-engine, the tripod, and the casement window. The clear and unaffected style of the author will commend itself to the reader.

Graphical Methods. By CARL RUNGE. Pp. vii+148. 6s. 6d. net. 1912. (Columbia University Press.)

"L'Algèbre n'est qu'une géométrie écrite, la géométrie n'est qu'une algèbre figurée."

Graphical methods are no doubt a most valuable means of giving to the student a clear idea in concrete form of the symbolism which, without their aid, may remain more or less of a mystery to the minds of the majority.

Prof. Runge passes in review the various methods that have been contrived by ingenious minds to meet special needs, and then proceeds to generalise them "so as to facilitate their application in any problem with which they are mathe-

matically connected." Beginning with graphical calculation as applied to arithmetic, integral and linear functions, and complex numbers, he proceeds from the graphical representation of functions of one or more independent variables to the graphical methods in the differential and integral Calculus. He keeps in sight the imperative necessity—especially in the case of the young engineer and others who will use graphs in the ordinary routine of their daily work—of acquiring facility in the application of the fundamental ideas. "You might as well try to learn piano-playing only by attending concerts as to learn the graphical methods only through lectures." The book is well conceived, and should prove extremely suggestive to those who master its contents.

The Elements of Descriptive Astronomy. By E. O. TANCOCK. Pp. 110. 2s. 6d. net. 1913. (Clarendon Press.)

As the sub-title indicates, this little book is "A simple account of the Celestial Bodies and their motions." The author suggests that it will be useful for such elementary examinations as those taken by the Boy Scouts. The explanations explain and the illustrations and diagrams are deserving of special mention. We are inclined to think that this unpretentious little introduction to the marvels of the sky will induce many a boy to seek for further information, and will develop a taste for practical work in those who are fortunate enough to be taken through this course.

Marsh's Mathematics Work-Book. Designed by H. W. MARSH. 3s. net. 1913. (Wiley, Chapman & Hall.)

Mr. Marsh provides each boy with some 250 pages of good writing paper in a strong cover, which looks as if it would stand years of wear. Large paper fasteners attach the sheets to this cover, so that they are easily detachable. A few Daily Record sheets are supplied, comprising, after spaces for Name, Subject, Course, Term, divisions headed: Date, Paragraph, Page, Problem or Theorem, Remarks, Hours Outside Preparation, Grand Total in hours, Subjects Totals in hours. This is followed by the following: I certify that the above is a true record of the time actually devoted by me to the outside individual preparation of the work specified. To this the student's signature is to be appended, and he is warned on each Record that "well-arranged time is the surest sign of a well-arranged mind." Sheets pasted on the inside of the covers give minute directions for the use of the book, accompanied by many useful hints, *e.g.* "as soon as possible learn to draw a light, smooth, draftsman's line."

THE LIBRARY.

THE Library has now a home in the rooms of the Teachers' Guild, 74 Gower Street, W.C. A catalogue has been issued to members containing the list of books, etc., belonging to the Association and the regulations under which they may be inspected or borrowed.

The Librarian will gladly receive and acknowledge in the *Gazette* any donation of ancient or modern works on mathematical subjects.

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1 copy	„	Nos. 1, 2.

FOR SALE.

Whitehead's *Universal Algebra*, Vol. I.; Whittaker's *Modern Analysis*, *Analytical Dynamics*; Forsyth's *Theory of Functions*; Baker's *Multiple Periodic Functions*; *Proceedings of Fifth International Congress of Mathematicians*, 1912. *Nouvelles Annales des Mathématiques*. 1891-1912, and many others.

For list and offers, apply S.B. c/o Editor, *Mathematical Gazette*.

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